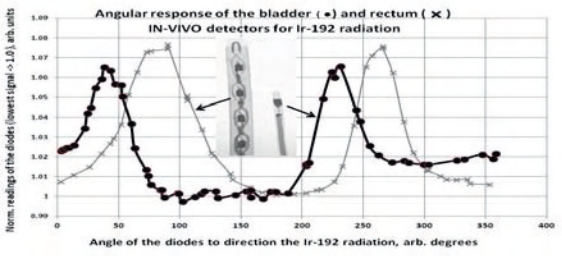

Conclusions: Performed measurements were shown the similar as for rectum detector angular dependence of IN-VIVO bladder detector readings for Ir-192 radiation. Results make obvious that for more accurate probe calibration the angular testing of its sensitivity should be done. Angular and off-axial components of the diode response should be identified. The best angular ranges for performing the long-term reproducibility calibrations should be recognized and appropriate marking on the catheter surface should be done. The fluoroscopic images, which are taken during treatment planning procedure, allow to find out the angle of the detector to direction of radiation coming from the radiation source and based on that appropriate correction factor can be estimated. As the final result of all these actions it can be achieved more agreement between planning treatment dose calculations and IN-VIVO measurements.

EP-1137

Rapid Arc Patient-specific dosimetry with a novel ISORAD diode.

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Purpose/Objective: Volumetric modulated arc radiotherapy (VMAT) or Rapid Arc (RA) is being widely used for highly conformal dose distribution and faster treatments as well. It is a system for intensity-modulated radiotherapy treatment (IMRT) delivery that achieves high dose conformality by optimizing the dose rate, gantry speed, and the leaf positions of the dynamic multileaf collimator (DMLC). Stringent dosimetric verification is required for accurate delivery of planned dose from the treatment planning system (TPS). Recently, a novel ISORAD™ (Sun Nuclear, USA)cylindrical diode was procured and the objective of this study was to perform the rapid arc patient-specific dosimetry with this diode.
Materials and Methods: RapidArc patient-specific dosimetry was carried out for eight patients (n = 8) with carcinoma of prostate. All the patients were planned on Eclipse (8.6.1, Varian,USA) TPS with 6 MV x-rays from a dual energy Novalis Tx linear accelerator (Varian, USA). A single arc was used for all the patients. Progressive Resolution Optimization (PRO) and Analytical Anisotropic Algorithm (AAA) were used for arc optimization and dose calculation respectively. Verification plan was generated in Eclipse for all the patients. For this, a solid water slab phantom (30 cm x 30 cm x 30 cm) with ISORAD diode was scanned in computed tomography (CT) machine (GE, USA). A separate indigenous adaptor was designed and fabricated for this diode to be used in these slabs. The dose was calculated at central axis and was noted. The same setup was simulated on linac and dose was measured at the isocentre. All measurements were compared with theTPS dose calculation via absolute point dose comparison. The film and ion chamber results were similarly compared with the ion chamber (FC65G, IBA, Sweden) measurements as well. Prior to this, the diode was calibrated against a reference ionization chamber at the same depth and the diode sensitivity correction was determined.
Results: The diode readings were reproducible and the sensitivity correction factor was 1.10. Absolute point dose measurements agreed well with treatment planning system computed doses (ion chamber: mean deviation,1.2%, range, -0.5% to 2.9%; ISORAD: mean deviation, 0.3%, SD 1.6, range, -0.4%to 2.8%). The institutional dosimetry acceptance criterion for IMRT/VMAT is ±3%.
Conclusions: For pre-treatment plan verification of advanced treatment techniques volumetric modulated arc therapy, a fast and reliable dosimetric device is required. In this study, we investigated the suitability of ISORAD for verification of Rapidarc therapy plans. The measurements and dosimetry proves that ISORAD can be used for quantifying absolute dose as an alternative to ion chamber measurement. However, ion chamber measurements are recommended for absolute dose comparison. Moreover, this diode was found useful due to its cylindrical shape an ease of setup.

EP-1138

Preliminary results of a new external quality control protocol for stereotactic CyberknifeÆ treatments.

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Purpose/Objective: To develop a protocol (irradiation procedure, action levels) for an external quality control of stereotactic beams of Cyberknife® with Equal-Estro laboratory. These preliminary studies involved seven French institutions.
Materials and Methods: Equal-Estro provided a cubic water-equivalent plastic phantom (so-called'mini-cube') containing four thermoluminescent detectors, TLDs, (TLD-100, Harshaw) and three radiochromic films (Gafchromic EBT2). This phantom was designed to be inserted in ananthropomorphic head phantom used to perform end-to-end quality controls. The phantom had to be irradiated according to a protocol describing a target volume in which three TLDs were encompassed with a 5mm isotropic margin, and one organ at risk represented by the fourth TLD. A maximum dose of 4.1Gy was prescribed to the target volume. After irradiation in a single fraction, the 'mini-cube' phantom was returned to Equal-Estro laboratory to be analyzed and measured doses were compared to calculated doses. Absolute dose deviations were evaluated using the TLDs and gamma-index analyses were performed on films. A preliminary study was performed to determine the statistical accuracy and the most appropriate action levels to be applied to all tests.
Results: Intrinsic TLD dose measurement on Cyberknife beams is reliable as reproducibility was of about 1.7% (1 SD) for a single beam. Dose deviations were lower than 5% for PTV-TLDs in most of the tested centers but larger deviations were observed on the OAR-TLD in some institutions. Investigations performed subsequently have identified the non homogeneous dose distribution onthe TLD to be the main cause of measured deviations. Analyses of different gamma-index criteria allowed choosing the 5%/2mm as the most appropriate tolerance level for gamma index tests, which is consistent with the film analysis procedure uncertainty (mostly due to the matching uncertainty of dose distributions).
Conclusions: An accuracy of 5% can be achieved if dose inhomogeneity in TLDs volumes is reduced in the planning process. The final version of the planning protocol will include the use of a PTV and a PRV around the TLDs, with constraints on dose homogeneity on the DVHs. This work will be followed by a second round of irradiations using the improved version of the procedure.

ELECTRONIC POSTER: PHYSICS TRACK: DOSE MEASUREMENTS

EP-1139

Evaluation of Dosi-Secure® dosimeter for in vivo dosimetry in external radiotherapy

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Purpose/Objective: The aim of this work is to characterize the Dosi-Secure® detector for in vivo dosimetry in High Energy photon beams. Measurements are first performed on phantom and then on patients to determine the level of accuracy of the device in clinical use.
Materials and Methods: TheDosi-Secure® system consists of a wireless and passive detector (Dosi-Patch®), a tactile reader (Dosi-Pad®) and an associated software. This system ensures the traceability of in vivo dosimetry for each patient during the radiotherapy session. The detector is based on a specific PMOS technology. A build-up cap is incorporated to allow measurements at the maximum depth dose (entrance dose). The dosimeters are calibrated by the manufacturer; there have no embedded correction factors. The dosimeters are placed on the surface of a water equivalent slab phantom and irradiated with 8MV and 25MV photon beams. The influence of the variation of different parameters on detector response is evaluated: field size (open and wedged beams), SSD and angular incidence. All